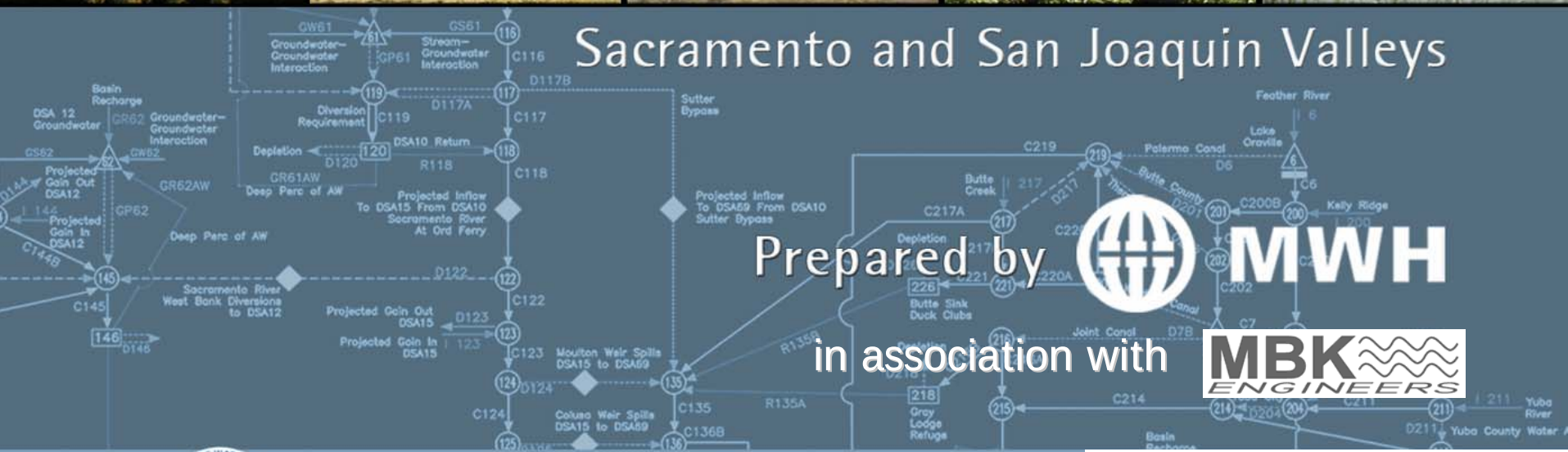
CalSim-III Hydrology Development





Sacramento and San Joaquin Valleys



Prepared by MWH

in association with MBK ENGINEERS

California Department of Water Resources

Nov. 30, 2006

Today's Discussion: CalSim & C2VSIM

- CalSim-III Development Goals
- Approach to integrating IWFM into CalSim
  - Required modifications in CalSim structure
  - Formulation of IWFM for purposes of CalSim
- Sensitivity of the IWFM budgets to parameterization
- Discussions on IWFM inputs to CalSim:
  - Surface (precipitation) runoff
  - Applied (crop) water requirements
  - Return flow from irrigation
  - Net deep percolation (precipitation/applied water)

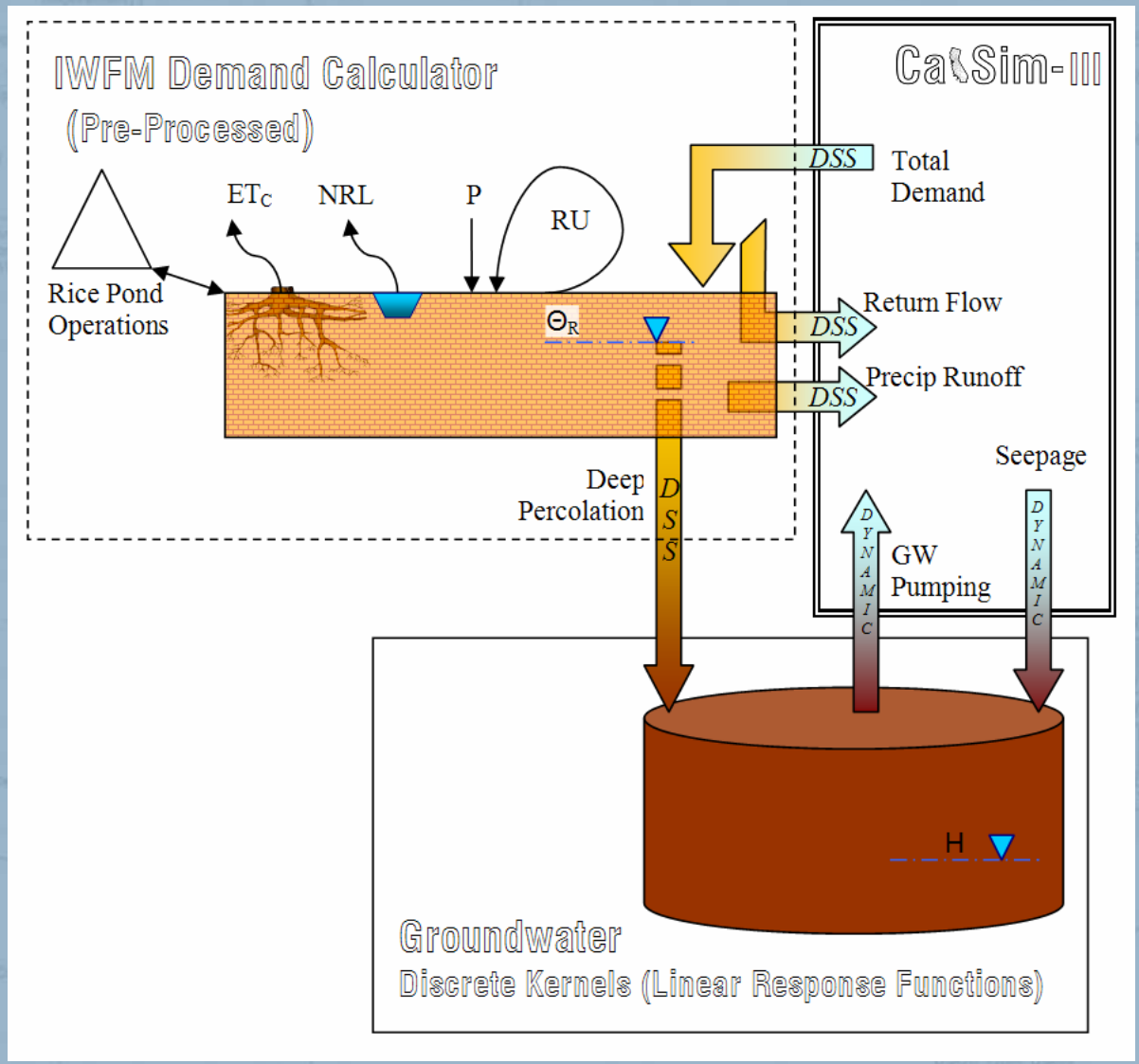
Overall Goals for CalSim-III Hydrology Development Project

- Improve accessibility and documentation of CalSim
- Reduce development time for new hydrology inputs
- Disaggregate DSAs and associate demands with specific water sources

… related to C2VSim:

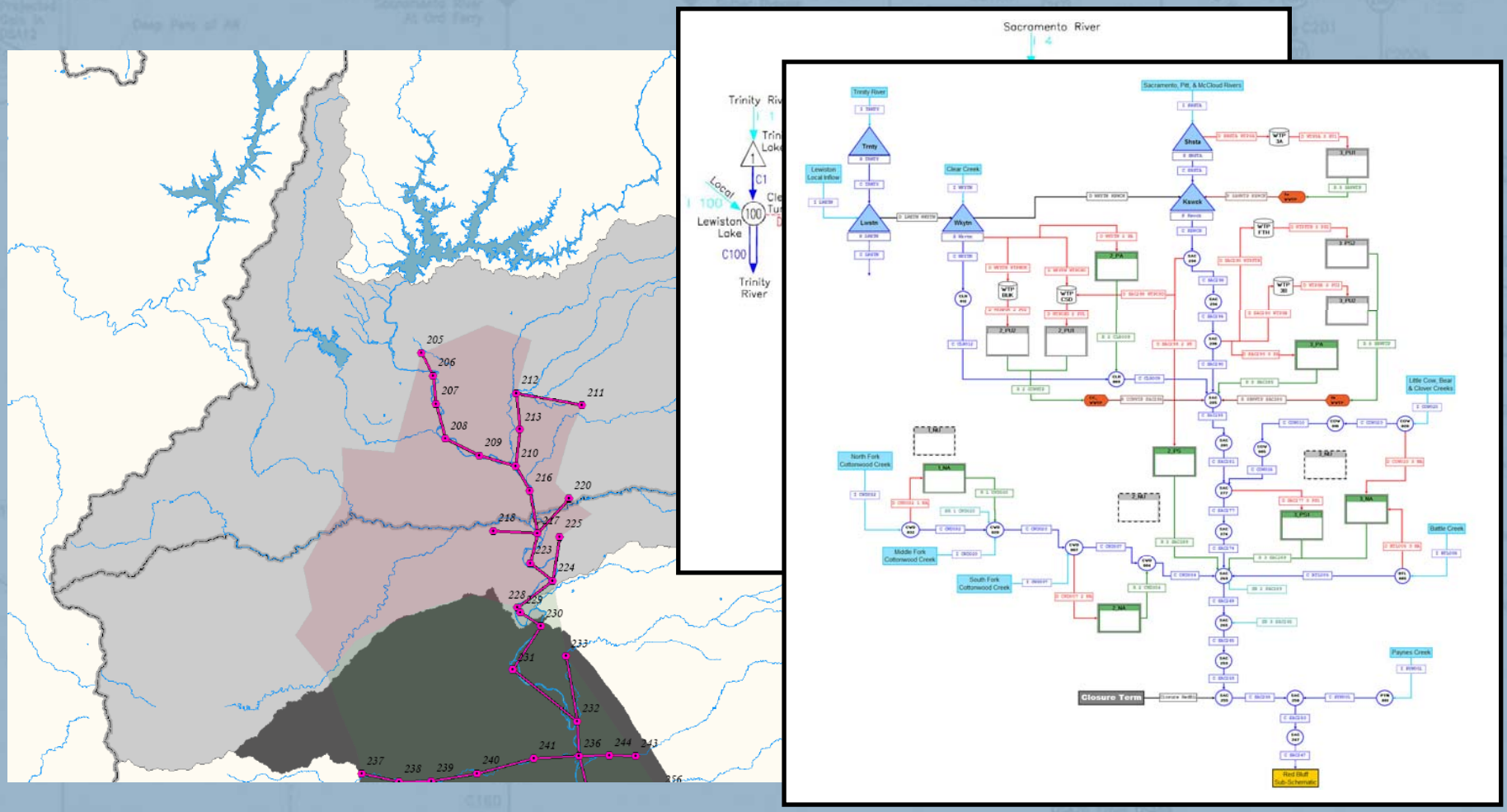
- Reconcile differences between C2VSIM and CalSim
- Improve accuracy of water supply estimates and water use efficiencies
- Represent groundwater with sufficient accuracy for preliminary conjunctive-use studies, in CalSim

Modular Integration of IWFM into CalSim-III



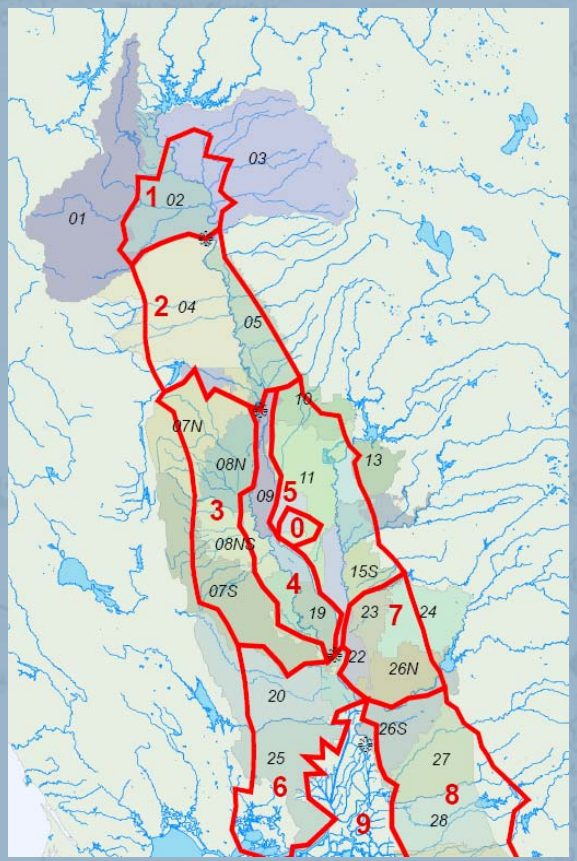
CalSim modifications for IDC

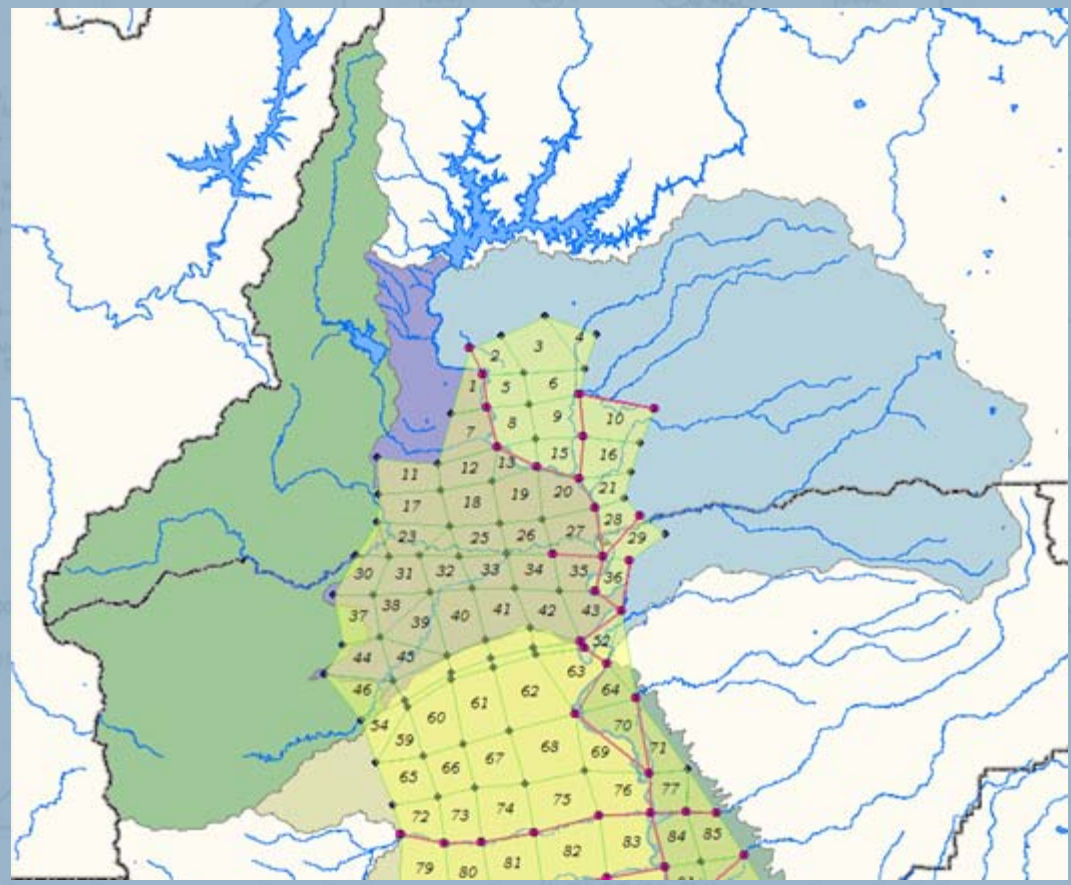
- Assure 1-to-1 stream node correspondence



CalSim modifications for IDC

- Overlay areas for Surface Fluxes (Groundwater pumping & Net Deep Percolation)





IWFM specifications for CalSim-III

C2VSIM

- Monthly timestep
- Aggregate virtual crop for entire DSA
- Rice field operations are not represented

CalSim-III's IDC

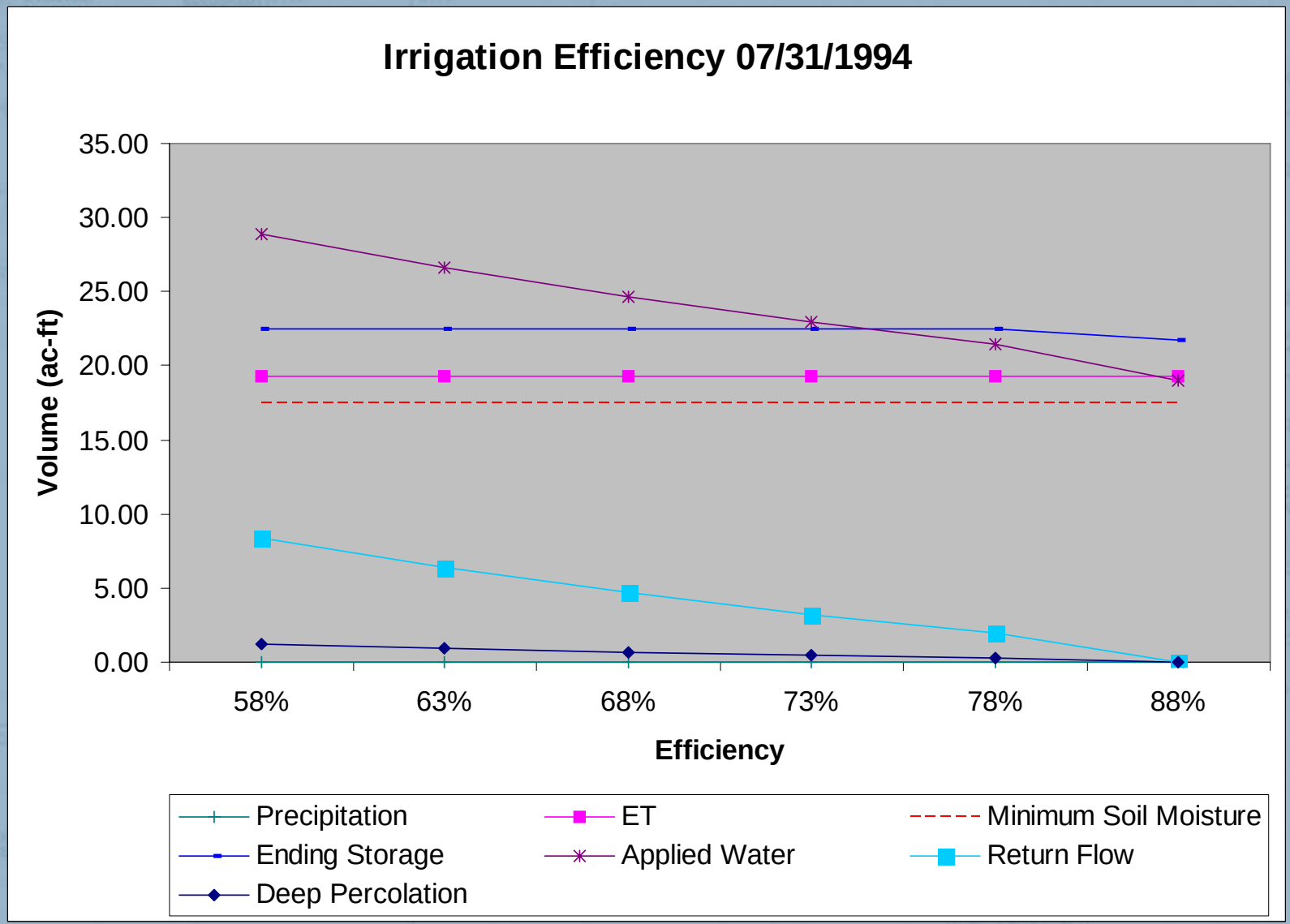
- Mixed daily/monthly timestep (for precip.)
- Crop by crop representation for each Demand Unit
- Rice field operations are post-processed
- Differences in re-use

Sensitivity of IWFM Root Zone Budget to Parameter Selection

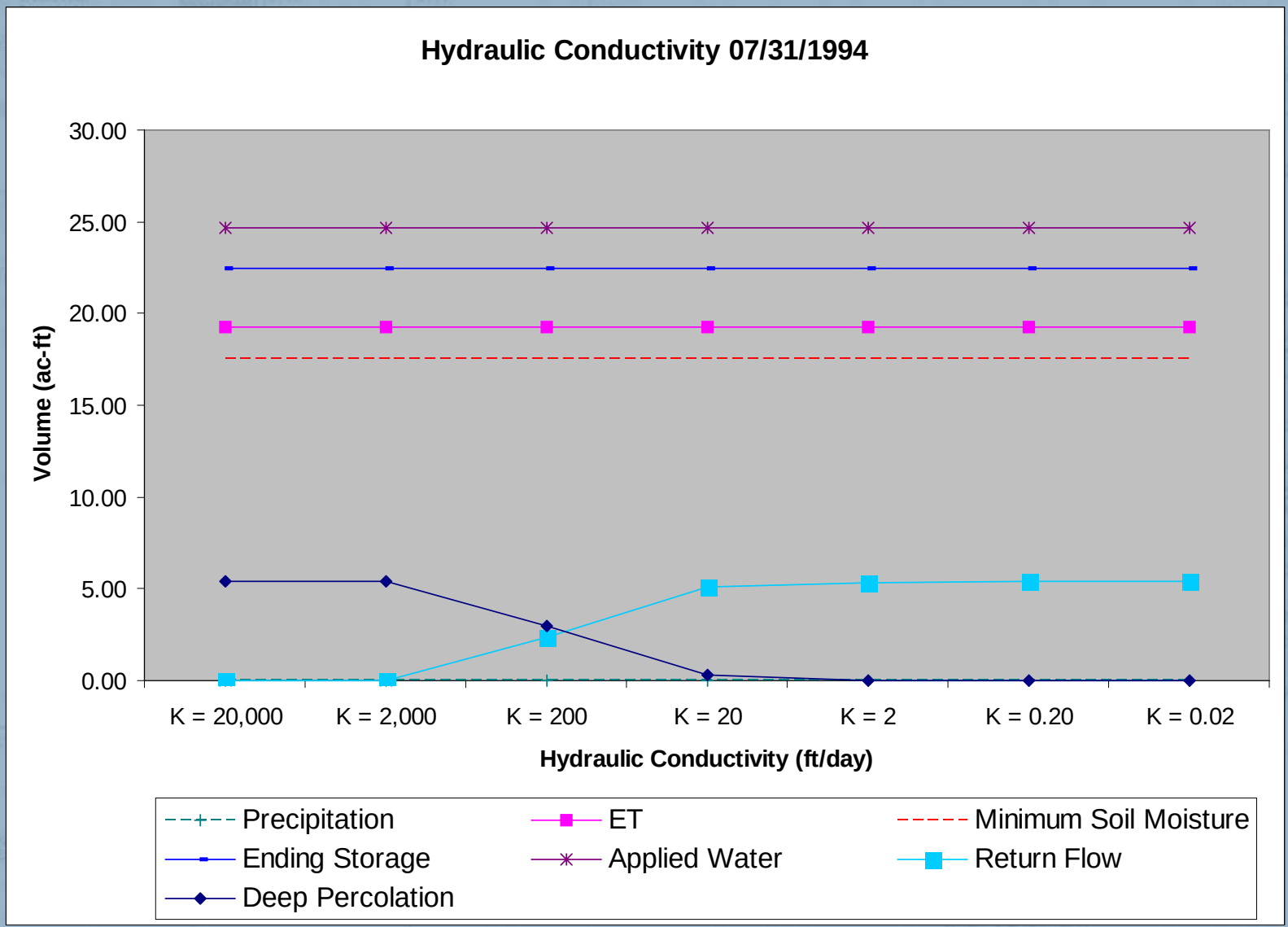
<u>Starting Point</u>

- 30 acres of Alfalfa
- 'Un-calibrated' parameters/inputs from Yuba Basin
  - Irrigation efficiency provided by DPLA data
  - DP assumed to be 13% of *excess soil moisture*
  - Re-use assumed to be zero
- Methods
  - Vary irrigation efficiency
  - Vary K ("physical" and "conceptual" parameters)
  - Vary % Re-use

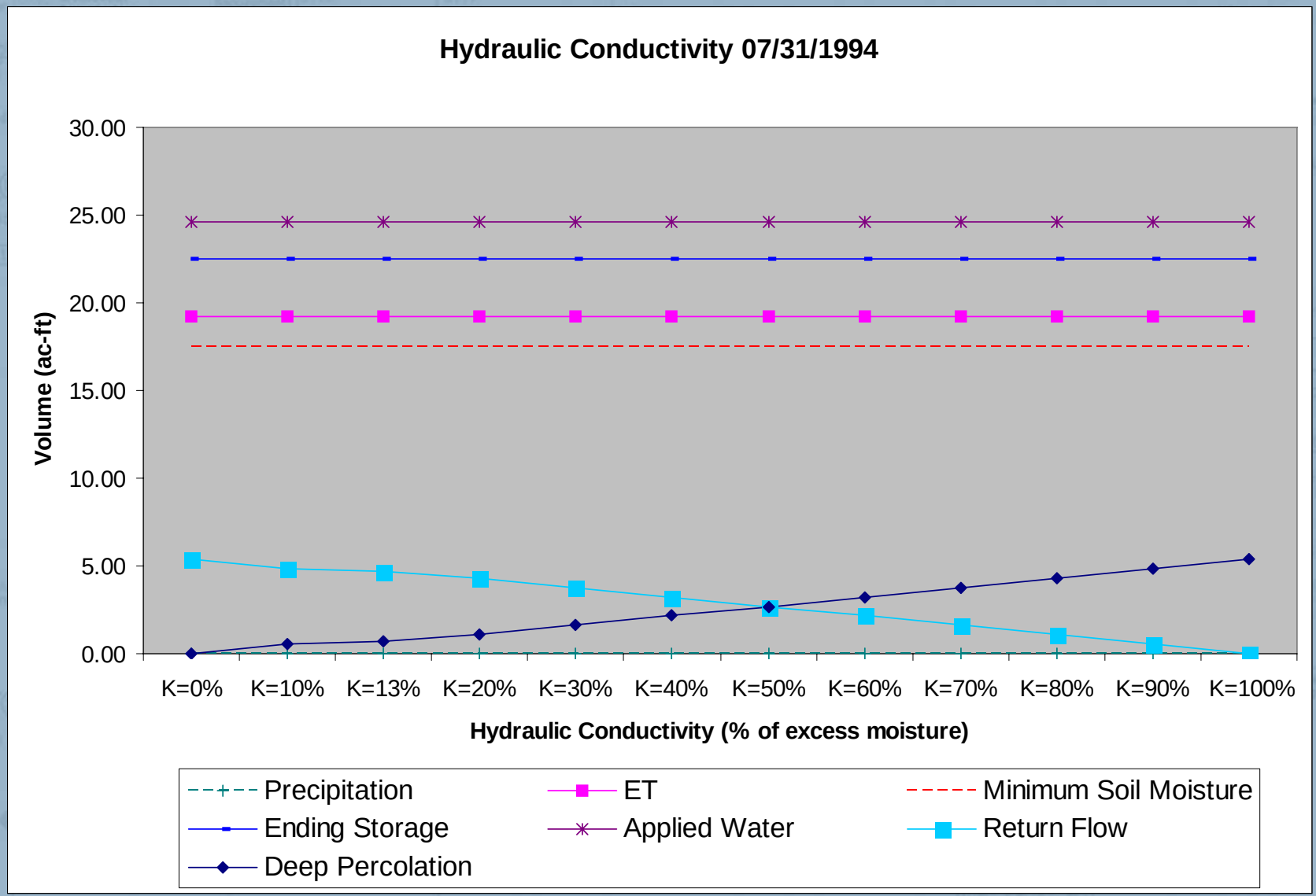
Changes in Irrigation Efficiency



Physical K Values



Conceptual K Values



IWFM Demand Calculator (IDC)

Run 1

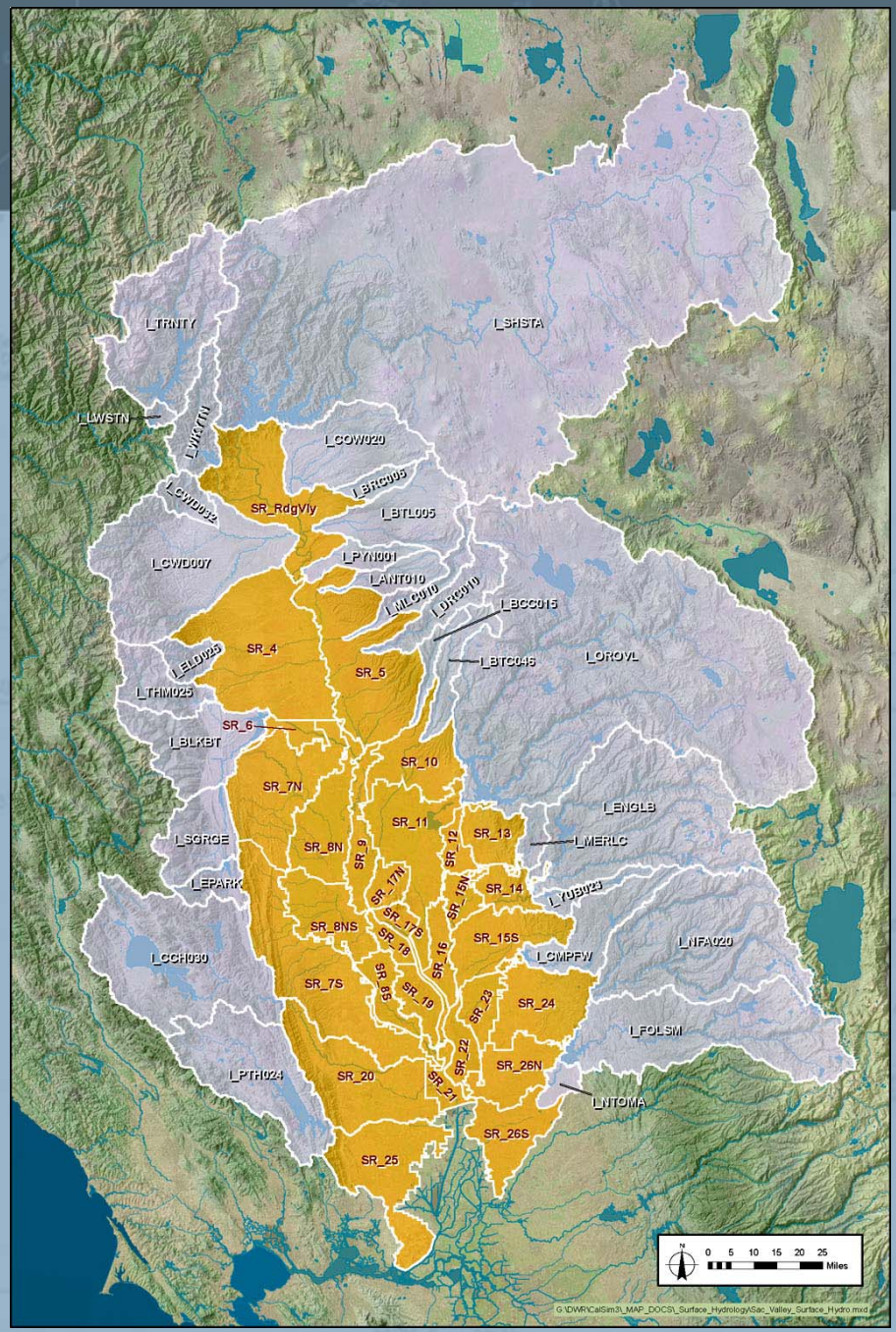
- Daily Timestep
- Outputs
  - Infiltration by crop & WBA for use in Run 2
  - Surface Runoff by Valley Watershed to DSS file

Run 2

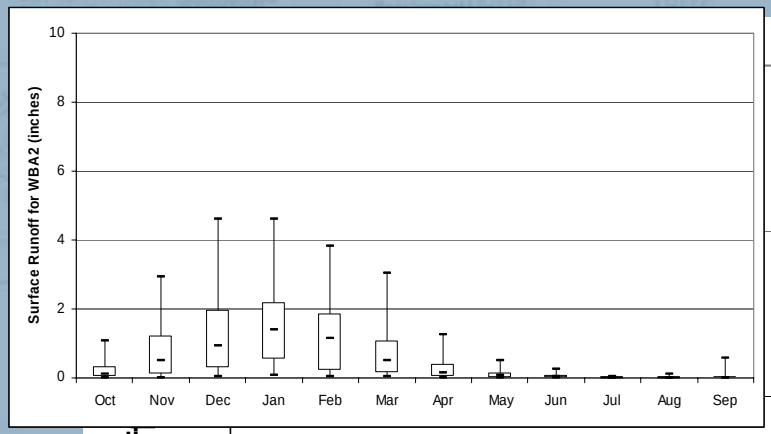
- Monthly Timestep
- Input from Run 1
  - Infiltration Timeseries
- Outputs
  - Applied Water demand
  - Agricultural Returns
  - Deep Percolation

Surface Runoff

- Inflows from ‘rim-watersheds’ developed from direct or correlated gage data
- Surface runoff in the ‘valley-watersheds’ was modeled in IDC
  - Daily Precipitation developed using PRISM grid-averages
  - In IDC, rainfall depths were assumed uniform over each ‘valley-watershed’
  - Textbook SCS curve numbers (CN) applied to land cover
  - Generalized soil characterization for valley watersheds



Surface Runoff Results



CalSim-III Demands with IDC

CalSim-III Demands

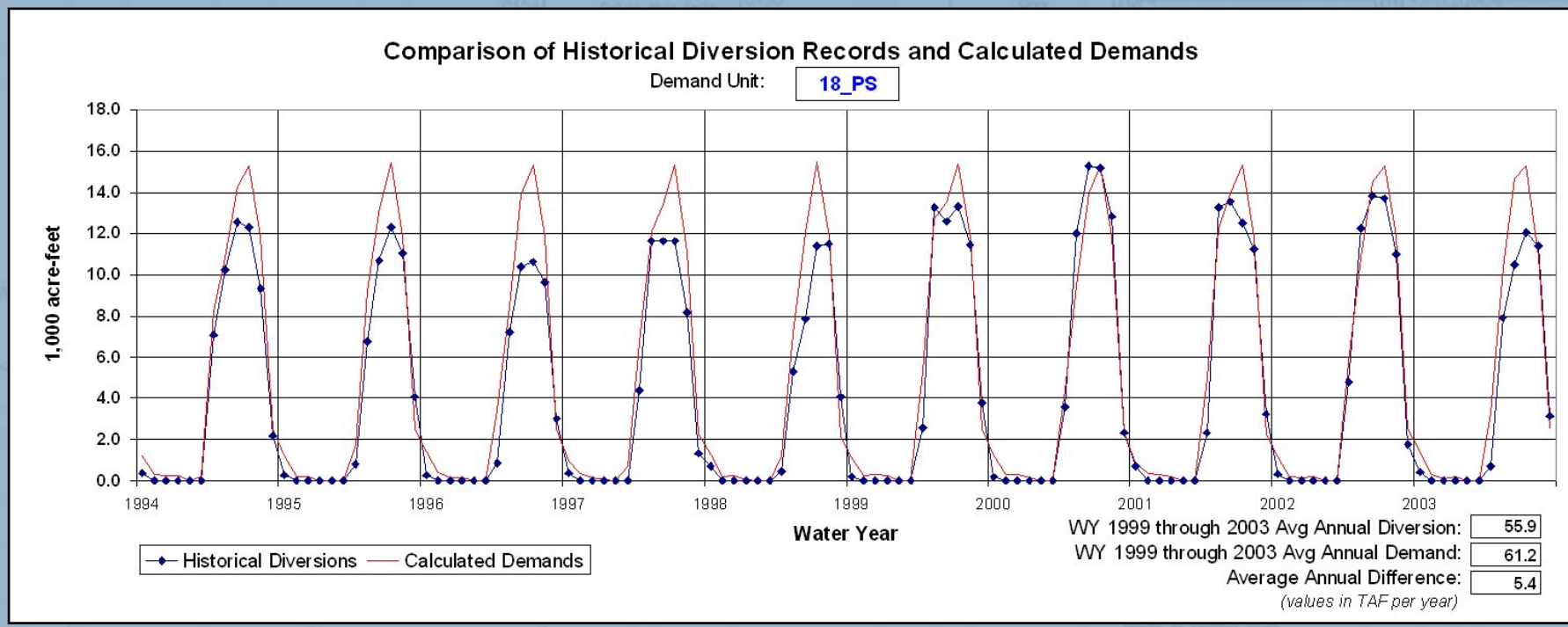
- CalSim demands previously estimated with DWR CU Model
- CalSim-III uses IDC to simulate root zone and output:
  - Applied water demand
  - Surface return flow
  - Deep percolation
  - Precipitation runoff

Output Post-Processors

- Reuse within demand units
- Rice operations
  - Irrigation season ponding
  - Rice straw decomposition
  - Modification to output:
    - Applied water demand
    - Surface return flow
    - Deep percolation

Demand Calibration

- IDC demands compared to historical diversion data
- Demands calibrated at demand unit level

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Questions/Clarifications?

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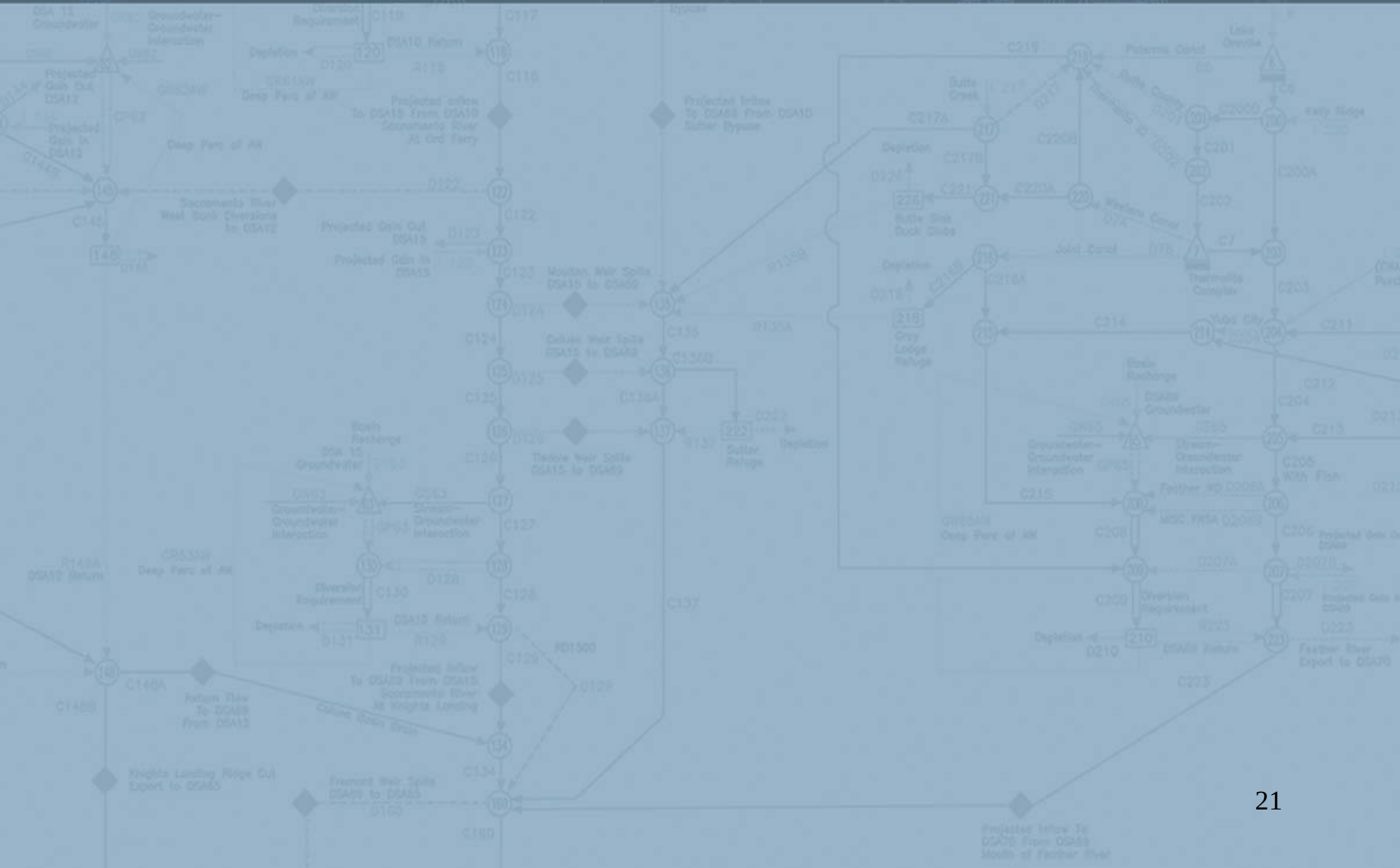

CalSim-II Hydrologic Elements

- Demands →
  Calculated with CU Model
- Return Flows →
  Calculated with CU Model
- Deep Percolation →
  Estimated from CVGSM results
- Surface (Precipitation) Runoff →
  Lumped into Accretions / Depletions
- Unconfined Aquifer Storage→
  Simplified representation in CalSim

Varying % Re-Use